CLAIMS

1. Coplanar-discharge electrode plate (1) for defining discharge regions (3) in a plasma display panel, which comprises:

- at least a first and a second array of coplanar electrodes that are coated with a dielectric layer (6) and the general directions of which are parallel, where each electrode (Y) of the first array is adjacent to an electrode (Y') of the second array, is paired with it and is intended to supply a set of discharge regions;

- for each discharge region (3), at least two electrode elements (4, 4') that have a common longitudinal axis of symmetry Ox, each connected to an electrode (Y, Y') of a pair,

characterized in that, for each electrode element (4) of each discharge region (3), the point O on the Ox axis being located on what is called an ignition edge of the said electrode element (4) facing the other electrode element (4') of the said discharge region (3) and the Ox axis being directed towards what is called an end-of-discharge edge that delimits the said element (4) on the opposite side from the said discharge edge and is positioned at $x = x_{cd}$ on the Ox axis, the shape of the said electrode element and the thickness and composition of the said dielectric layer are adapted so that there is an interval $[x_{ab}, x_{bc}]$ of values of x such that $x_{bc}-x_{ab} > 0.25x_{cd}$, $x_{ab} < 0.33x_{cd}$ and $x_{bc} > 0.5x_{cd}$ and such that the surface potential V(x) increases as a function of x in a continuous or discontinuous manner, without a decreasing part, from a value V_{ab} to a higher value V_{bc} within the said $[x_{ab}, x_{bc}]$ interval when a constant potential difference is applied between the two electrodes supplying the said discharge region, having the appropriate sign so that the said electrode element (4) acts as cathode.

2. Coplanar electrode plate according to Claim 1, characterized in that $V_{norm}(x')-V_{norm}(x) > 0.001$ whatever

x and x' are, chosen between x_{ab} and x_{bc}, such that x'-x = 10 μm.

3. Coplanar electrode plate according to Claim 1 or 2, characterized in that, defining the normalized surface potential $V_{norm}(x)$ as the ratio of the surface potential V(x) at a level x of the dielectric layer for the electrode element in question to the maximum potential $V_{0\text{-}max}$ that would be obtained along the Ox axis for an electrode element of infinite width, the normalized surface potential $V_{norm}(x)$ increasing from a value of $V_{n\text{-}ab} = V_{ab}/V_{0\text{-}max}$ at the start ($x = x_{ab}$) of the said interval to a value of $V_{n\text{-}bc} = V_{bc}/V_{0\text{-}max}$ at the end ($x = x_{bc}$) of the said interval, then:

$$V_{n\text{-}bc} > V_{n\text{-}ab},\ V_{n\text{-}ab} > 0.9, \text{ and } (V_{n\text{-}bc} - V_{n\text{-}ab}) < 0.1.$$

4. Coplanar electrode plate according to any one of the preceding claims, characterized in that, under the same conditions of application of the potential difference between the said electrodes, the maximum potential in the surface region of the dielectric layer that covers the said element and is bounded by the said end-of-discharge edge where $x = x_{cd}$ and the position $x = x_{bc}$ is strictly greater than the maximum potential of the surface region of the dielectric layer that covers the said element and is bounded by the said ignition edge where x = 0 and the position $x = x_{ab}$.

5. Plasma display panel, characterized in that it is provided with a coplanar electrode plate according to any one of Claims 1 to 4.

6. Coplanar electrode plate according to any one Claims 1 to 4, characterized in that, defining the specific longitudinal capacitance C(x) of the dielectric layer as the capacitance of a straight elementary strip of this layer, bounded between the said electrode element (4) and the surface of the dielectric layer, positioned at x on the Ox axis, having a length dx along this Ox axis and a width corresponding to that of the electrode element delimiting the said elementary strip, in order to achieve the said increase in surface potential, this

specific longitudinal capacitance C(x) of the dielectric layer increases continuously or discontinuously, without a decreasing part, from a value of C_{ab} at the start ($x = x_{ab}$) of the said interval to a value of C_{bc} at the end ($x = x_{bc}$) of the said interval.

7. Coplanar electrode plate according to Claim 6, characterized in that the capacitance of the dielectric layer portion that lies between the said element and the surface of this layer and is bounded by the said end-of-discharge edge where $x = x_{cd}$ and the position $x = x_{bc}$ is strictly greater than the capacitance of the dielectric layer portion that lies between the said element and the surface of this layer and is bounded by the said ignition edge where $x = 0$ and the position $x = x_{ab}$.

8. Coplanar electrode plate according to Claim 7, characterized in that the specific longitudinal capacitance of the dielectric layer in the region lying between $x = x_{bc}$ and $x = x_{cd}$ is greater than the specific longitudinal capacitance of the dielectric layer at any other position x such that $0 < x < x_{bc}$.

9. Plasma display panel, characterized in that it is provided with a coplanar electrode plate according to any one of Claims 6 to 8.

10. Plasma display panel comprising a coplanar electrode plate (1) according to any one of Claims 1 to 4 and what is called an address electrode plate (2) optionally comprising an array of address electrodes (X) that are coated with a dielectric layer (7) and are oriented and positioned so that each crosses a pair of electrodes of the coplanar electrode plate in one of the said discharge regions, these electrode plates defining between them the said discharge regions and being separated by a distance H_c expressed in microns, characterized in that, for each discharge region (3) of the said display panel and for each electrode element (4, 4') of this region,

letting E1(x) be the mean thickness expressed in microns and P1(x) be the mean relative permittivity of

the dielectric layer above the said electrode element (4) at the longitudinal position x and letting E2(x) be the mean thickness expressed in microns and P2(x) be the mean relative permittivity of the dielectric layer above the said address electrode (X), or that of the address electrode plate (2) in the absence of the address electrode, the thickness and the permittivity both again being measured at the longitudinal position x located on an axis which lies on the surface of the address electrode plate and is parallel to the Ox axis and lying in a plane normal to the surface of the said coplanar electrode plate,

the thickness and the composition of these layers are adapted so that the ratio $R(x) = 1-[E_{1(x)}/P_{1(x)}]/[E_{1(x)}/P_{1(x)} + H_c + E_{2(x)}/P_{2(x)}]$ increases continuously or discontinuously, without a decreasing part, from a value of R_{ab} at the start ($x = x_{ab}$) of the said interval to a value R_{bc} at the end ($x = x_{bc}$) of the said interval.

11. Plasma display panel according to Claim 10, characterized in that the width $W_e(x)$ of the said electrode element is constant within the said range of x values.

12. Plasma display panel according to Claim 11, characterized in that $R(x')-R(x) > 0.001$ whatever x and x' are, chosen between x_{ab} and x_{bc}, such that $x'-x = 10\ \mu m$.

13. Plasma display panel according to Claim 12 or 13, characterized in that $R_{bc} > R_{ab}$, $R_{ab} > 0.9$, and $(R_{bc} - R_{ab}) < 0.1$.

14. Plasma display panel according to any one of Claims 11 to 13, characterized in that the values of R(x) for any x such that $x_{bc} < x < x_{cd}$ are strictly greater than the values of R(x) for any x such that $0 < x < x_{ab}$.

15. Plasma display panel according to Claim 14, characterized in that the values of R(x) for any x such that $x_{bc} < x < x_{cd}$ are strictly greater than the values of R(x) for any x such that $0 < x < x_{ab}$.

16. Coplanar electrode plate according to any one of Claims 6 to 8, characterized in that, for each electrode element (4) of each discharge region (3), the said dielectric layer (6) has a constant dielectric constant P1 and a constant thickness E1 expressed in microns above the said electrode element (4), at least for any x such that $x_{ab} < x < x_{bc}$, and in which, with the following definitions:

- the normalized surface potential $V_{norm}(x)$, defined as the ratio of the surface potential V(x) at a level x of the dielectric layer for the electrode element in question to the maximum potential $V_{0\text{-}max}$ that would be obtained along the Ox axis for an electrode element of infinite width, the normalized surface potential $V_{norm}(x)$ then increasing from a value of $V_{n\text{-}ab} = V_{ab}/V_{0\text{-}max}$ at the start ($x = x_{ab}$) of the said interval to a value of $V_{n\text{-}bc} = V_{bc}/V_{0\text{-}max}$ at the end ($x = x_{bc}$) of the said interval;

- an ideal width profile of this element, defined by the equation:

$$W_{e\text{-}id\text{-}0}(x) = W_{e\text{-}ab} \exp\{29\sqrt{(P1 / E1)}\ (x-x_{ab}) \times (V_{n\text{-}bc}-V_{n\text{-}ab})/(x_{bc}-x_{ab})\}$$

where $W_{e\text{-}ab}$ is the total width of the said element, measured at $x = x_{ab}$ perpendicular to the Ox axis; and

- a lower limit profile $W_{e\text{-}id\text{-}low}$ and an upper limit profile $W_{e\text{-}id\text{-}up}$, defined by the equations: $W_{e\text{-}id\text{-}low} = 0.85W_{e\text{-}id\text{-}0}$ and $W_{e\text{-}id\text{-}up} = 1.15W_{e\text{-}id\text{-}0}$,

then, for any x between x_{ab} and x_{bc} inclusive, the total width $W_e(x)$ of the said element, measured at x perpendicular to the Ox axis, is such that:

$$W_{e\text{-}id\text{-}low}(x) < W_e(x) < W_{e\text{-}id\text{-}up}(x).$$

17. Coplanar electrode plate according to Claim 16, characterized in that the width $W_{e\text{-}ab}$ is less than or equal to 80 µm.

18. Coplanar electrode plate according to Claim 17, characterized in that the width $W_{e\text{-}ab}$ is less than or equal to 50 µm.

19. Coplanar electrode plate according to any one of Claims 16 to 18, characterized in that the said electrode element (4) is subdivided into two lateral

conducting elements that are symmetrical with respect to the Ox axis and are separate at least in the region where x lies within the $[x_{ab}, x_{b3}]$ interval where $x_{b3}-x_{ab} > 0.7(x_{bc}-x_{ab})$.

20. Coplanar electrode plate according to Claim 19, characterized in that $x_{b3} = x_{bc}$.

21. Coplanar electrode plate according to Claim 19 or 20, characterized in that, if Oy is an axis transverse to the Ox axis lying along the ignition edge and letting $d_{e-p}(x)$ be the distance, measured parallel to the Oy axis at any position x lying between x_{ab} and x_{bc}, between the edges turned towards each other of these two lateral conducting elements, a value $x = x_{b2}$ lying between x_{ab} and x_{b3} exists such that $d_{e-p}(x) > d_{e-p}(x_{ab})$ for any value of x lying between x_{ab} and x_{b2}.

22. Coplanar electrode plate according to Claim 21, characterized in that $d_{e-p}(x_{ab})$ lies between 100 μm and 200 μm.

23. Coplanar electrode plate according to Claim 22, characterized in that, considering the mean line of each lateral conducting element traced, for a given position x, at mid-distance between the lateral edges of this lateral element, in the region where $x_{ab} < x < x_{b2}$, the tangent at x to the mean line of this element makes an angle of less than 60° with the Ox axis.

24. Coplanar electrode plate according to Claim 23, characterized in that the said angle lies between 30° and 45°.

25. Coplanar electrode plate according to any one of Claims 19 to 24, characterized in that, if Oy is an axis transverse to the Ox axis lying along the ignition edge and letting $d_{e-p}(x_{ab})$ be the distance, measured parallel to the Oy axis at a position $x = x_{ab}$ between the edges turned towards each other of the two lateral conducting elements, the said electrode element comprises a transverse bar called an ignition bar which connects the said lateral conducting elements, one edge of which corresponds to the said ignition edge, and the length of which, measured along the Ox axis, is greater

by a value ΔL_a for $|y|$ lying between 0 and y_1 on either side of the Ox axis than a value L_a of this length for $|y|$ lying between y_1 and $d_{e-p}(x_{ab})/2$ on either side of the Ox axis.

26. Plasma display panel, characterized in that it is provided with a coplanar electrode plate according to any one of Claims 16 to 25.

27. Plasma display panel comprising a coplanar electrode plate (1) according to any one of Claims 1 to 4 and an address electrode plate (2) comprising:

- an array of address electrodes (X) that are coated with a dielectric layer (7) and are oriented and positioned so that each crosses a pair of electrodes of the coplanar electrode plate in one of the said discharge regions;

- an array of parallel barrier ribs (16), each being placed between two adjacent address electrodes at a distance W_c from two other adjacent barrier ribs, these electrode plates defining between them the said discharge regions and being separated by a distance H_c,

characterized in that the said dielectric layer (6) has a homogeneous composition and a constant thickness above the said electrode element (4), at least for any x such that $x_{ab} < x < x_{bc}$, and in that, for each discharge region (3) of the said display panel and for each electrode element (4, 4') of this region, the said electrode element (4) is subdivided into two lateral conducting elements of constant width W_{e-p0} that are symmetrical with respect to the Ox axis and are separate in the region where x lies within the $[x_{ab}, x_{bc}]$ interval, and in that, if Oy is an axis transverse to the Ox axis lying along the ignition edge and letting $d_{e-p}(x)$ be the distance, measured parallel to the Oy axis at any position x lying between x_{ab} and x_{bc}, between the edges turned towards each other of these two lateral conducting elements, $d_{e-p}(x)$ increases in a continuous or discontinuous manner as a function of x in the said $[x_{ab}, x_{bc}]$ interval, and in that, considering the mean line of each lateral conducting element

traced, for a given position x, at mid-distance between the lateral edges of this lateral element, in the region where $x_{ab} < x < x_{bc}$, the tangent at x to the mean line of this element makes an angle of between 20° and 40° with the Ox axis, and in that $d_{e-p}(x_{ab}) \leq 350$ µm.

28. Plasma display panel according to Claim 27, characterized in that 200 µm $\leq d_{e-p}(x_{ab}) \leq$ 350 µm and in that the said electrode element comprises a transverse bar called an ignition bar which connects the said lateral conducting elements, one edge of which corresponds to the said ignition edge, and the length of which, measured along the Ox axis, is greater by a value ΔL_a for $|y|$ lying between 0 and y_1 on either side of the Ox axis than a value L_a of this length for $|y|$ lying between y_1 and $d_{e-p}(x_{ab})/2$ on either side of the Ox axis.

29. Plasma display panel according to Claim 28, characterized in that, if W_a is the width of the said ignition bar measured along the Oy axis,

- if $L_a < 2W_{e-p0}$, $\Delta L_a > 2W_{e-p0} - L_a$
- if $L_a \geq 2W_{e-p0}$, $\Delta L_a > 0.2L_a$.

30. Plasma display panel comprising a coplanar electrode plate (1) according to any one of Claims 1 to 4 and an address electrode plate (2), comprising:

- an array of address electrodes (X) that are coated with a dielectric layer (7) and are oriented and positioned so that each crosses a pair of electrodes of the coplanar electrode plate in one of the said discharge regions;
- an array of parallel barrier ribs (16), each being placed between two adjacent address electrodes,

these electrode plates defining between them the said discharge regions and being separated by a distance H_c, characterized in that the said dielectric layer (6) has a homogeneous composition and a constant thickness above the said electrode element (4), at least for any x such that $x_{ab} < x < x_{bc}$, and in that, if W_c is the distance between two adjacent barrier ribs, for each discharge region (3) of the said panel and for each

electrode element (4, 4') of this region, the said electrode element (4) is subdivided into two lateral conducting elements of constant width W_{e-p0}, the distance d_{e-p0} between the edges of which that are turned towards each other is constant and greater than W_c, which elements are symmetrical with respect to the Ox axis and separate in the region where x lies within the $[x_{ab}, x_{bc}]$ interval, and in that the said electrode element comprises:

- a transverse bar called an ignition bar, the width of which is greater than or equal to W_c, the length of which measured along the Ox axis is L_a and one edge of which corresponds to the said ignition edge;
- a transverse bar called a discharge stabilization bar, the width of which is greater than or equal to W_c, the length of which, measured along the Ox axis, is L_s, and one edge of which corresponds to the said end-of-discharge edge; and
- at least one intermediate transverse bar, the width of which is greater than or equal to W_c and the position of which, along the Ox axis, lies entirely within the $[x_{ab}, x_{bc}]$ interval over its entire length L_b; and in that $L_b \leq L_a < L_c$.

31. Display panel according to Claim 30, characterized in that, with one of the edges of the intermediate transverse bar being at a distance d_1 from the said discharge stabilization bar and the other edge being at a distance d_2 from the said ignition bar, then $d_2/2 < d_1 < d_2$.

32. Display panel according to Claim 31, characterized in that:

$$3 \times \max(L_a, L_b) < L_s > 5 \times \max(L_a, L_b).$$

33. Plasma display panel according to any one of Claims 5, 9, 10-15 and 26-32, characterized in that it comprises the said coplanar electrode plate (1) and an address electrode plate defining between them the said discharge regions (3) and in that, for each discharge region and for each electrode element, if W_{e-ab} is the

width of the said electrode element, measured along the Ox axis at the position $x = x_{ab}$ at the start of the said $[x_{ab}, x_{bc}]$ interval, the said electrode element preferably comprises a transverse bar called an ignition bar, one edge of which corresponds to the said ignition edge and the length of which, measured along the Ox axis, is such that: $W_{e-ab} \leq L_a < 80$ µm.

34. Plasma display panel according to Claim 33, comprising an array of parallel barrier ribs (16) placed between the said electrode plates (1, 2) at a distance W_c from one another, perpendicular to the general direction of the said coplanar electrodes, characterized in that, if Oy is an axis transverse to the Ox axis lying along the ignition edge and if W_a is the width of the said transverse ignition bar, measured along the Oy axis, then:

$$W_c - 60\ \mu m < W_a \leq W_c - 100\ \mu m.$$

35. Plasma display panel according to Claim 33, comprising an array of parallel barrier ribs (16) placed between the said electrode plates (1, 2) at a distance W_c from one another, perpendicular to the general direction of the said coplanar electrodes, characterized in that, if Oy is an axis transverse to the Ox axis lying along the ignition edge, if W_a is the width of the said transverse ignition bar measured along the Oy axis and if W_{a-min} corresponds to the width beyond which the said barrier ribs cause a substantial reduction in the surface potential of the dielectric layer above the said element, the said transverse ignition bar comprises:

- a central region Z_{a-c} for which, at any point $|y| \leq W_{a-min}/2$, the distance, along the Ox axis, between the ignition edges of the two electrode elements of the said discharge region is constant and equal to g_c; and
- two lateral regions Z_{a-p1}, Z_{a-p2} on either side of the central region Z_{a-c}, for which, at any point $|y| > W_{a-min}/2$, the distance, along the Ox axis, between the ignition edges of the two electrode elements of the

said discharge region decreases continuously from the value g_c.

36. Plasma display panel according to any one of Claims 5, 9, 10-15 and 26-35, characterized in that it comprises supply means suitable for generating, between the coplanar electrodes, various pairs of series of voltage pulses called sustain pulses, each with a constant plateau.